Alternator Stator Failure and Repair

Revised 4-1-2009

The alternator stator in the Honda GL500I Silverwing was replaced with a new one (mfg. <u>Electrex</u> <u>a.k.a. ElectroSport Industries</u>) as a preventive maintenance action in preparation for the <u>2006 vacation</u> <u>trip</u>. Installation went smoothly with no indication of any problems. After the engine was reassembled and installed the charging system was checked and found to be working properly.

On 2-5-2006 I took the bike out for a 100 mile test ride. The temperature was in the 30's F with gusty winds so this was a good opportunity to check out the <u>electrically heated jacket liner</u> and <u>Heat-troller</u>. The battery voltage was constantly monitored to assess charging system performance with this extra load. For 95 miles everything worked perfectly with the jacket liner keeping me toasty warm and the charging system maintaining approximately 14 Volts. Very nice.

Then about five miles from home the electrical system quit charging. Thankfully the battery had enough reserve capacity to make it home. A couple of hours later I decided to troubleshoot the electrical system - surprise, it was charging again. Well, for about five minutes it did. Then it quit charging. Over the next couple of days I isolated the problem - when the engine would warm up to normal operating temperature, the alternator stator windings would develop a short to ground.

At this point the bike had a total of 150 miles ridden on it since the new stator was installed.

The engine was then pulled and the rear engine case was removed to access the alternator stator.

The first photo shows the new Electrex stator while it was still installed in the rear engine case. The discoloration highlighted in the photo indicates several turns of the wire have overheated. There is a strong possibility that the insulation has been compromised so the stator must be replaced or rewound.



Here is a closeup view of the overheated wire turns.



A wire underneath the stator can be seen touching the stator mounting shoulder in this photo.



The stator was then removed from the rear engine case and set on the workbench. The place where the wire touched the mounting shoulder can be easily seen.



An Ohmmeter confirmed the short.



The corresponding location on the rear engine case mounting shoulder shows evidence of burnt insulation where the wire made contact.



Another location was found where the stator wire made contact with the mounting shoulder. A short circuit had not formed here <u>yet</u> but the wire insulation was seriously deformed.



Yet another short circuit in the making can be seen here.



There are four locations where the problem is most likely to occur.



The wires between poles on the original Honda stator are routed to prevent contact with the mounting shoulder.



For those folks contemplating a stator replacement, it would be prudent to ensure that the stator wires have plenty of clearance with the stator mounting shoulder. If there is any contact at all the insulation will likely fail due to vibration and rubbing. It's a lot of work to remove/disassemble/reassemble /replace an engine to replace a stator, and even more so to do it twice.

The Repair

The manufacturer of the stator, ElectroSport Industries, was contacted and made aware of these findings. He offered to provide a replacement stator at no charge, which I accepted. The stator had performed well under heavy load for an extended period of time prior to the failure so I had no reservations about installing another one like it. Of course, steps had to be taken to prevent a recurrence of the problem.

The inside rear engine cover was completely covered with a plastic trash bag and masking tape except for the four locations where the stator wires would most likely make contact.



Next, a Dremel tool with a carbide burr was used to trim the sharp corners at the four potential contact points.



The cutting operation created many metal filings. The vast majority of the filings were caught with the plastic bag and masking tape, although a few strays ended up inside the rear engine case. Much care was taken to ensure all remaining filings were removed using multiple sequences of flushing with a solvent, vacuuming, and blowing with compressed air. This is very important because **a single filing in the wrong place could destroy the engine**.



This is the mounting shoulder after the four corners were trimmed.



A black permanent marker was used to mark the replacement stator's wires where rubbing would most likely occur.



A test fit was then performed. The stator was carefully set in place and rotated slightly by hand while pressing sideways against the mounting shoulder in all directions.



The stator was then removed and inspected for signs of rubbing as would be indicated by scratching of the marker ink. No problems were found.



At this point the replacement stator was installed and the engine was reassembled and reinstalled in

the bike. The charging system was tested and found to be working properly.

Testing continued in preparation for the upcoming extended trip.

I wish to especially thank Dan Topping for his excellent suggestions and comments. Dan correctly postulated the exact failure mode before I had even removed the engine and suggested the corrective action taken.

The material on this web page describing the stator failure and repair may be freely copied and distributed.

Subsequent Failure

I thought things were well in hand with the new stator and set out on the trip. About 1300 miles into the trip the new stator failed near Lubbock, TX.

The failure mode was again a short to ground, but this time it was located on the side opposite the mounting shoulder.

This is definitely a manufacturing defect where the wire insulation chafed at the sharp corner of the pole.



Note the green insulating material. If it is consistently applied and relatively thick, it should provide

some extra insulation and cushioning to reduce the likelihood that a wire winding could chafe against the sharp edge of a pole and short out to ground. In the above photo this insulation is either very thin or missing. Compare this photo to several of the others on this page and note the difference in insulation coverage.

At this point I could not envision installing another Electrex stator. Honda has now discontinued the stator so a new OEM stator was out of the question. A used stator from a low mileage parts bike was temporarily installed and thousands of miles were ridden with no further problems. This stator was subsequently replaced with a rewound unit from Custom Rewind, again as a preventive measure given the age of the used one. The Custom Rewind stator has had several thousand miles on it so far with no problems.

Stator Rewinding

If and when the need arises in the future to have a stator replaced, my plans are to have a Honda stator rewound by a competent and reputable company specializing in rewinding stators. Several such sources are listed below.

Custom Rewind

<u>Custom Rewind</u> in Birmingham, Alabama has earned an excellent reputation among CX/GL owners for their high quality work in rewinding stators. I've heard nothing but praise for their work and concur with others' recommendations.

Their website appears to be new but they have been in business for quite a while. The preferred method of communication with them is by phone at 205-798-7282 or toll free at 800-798-7282.

Their mailing address is:

Custom Rewind 2014 Pratt Highway Birmingham, AL 35214

West Country Windings

<u>West Country Windings</u> earned an excellent reputation among UK CX/GL owners for high quality rewinds over a period of many years. However, lately they seem to have experienced some quality issues and are therefore no longer recommended.

They can be reached at West Country Windings, 79 City Business Park, Somerset Place, Stoke, Plymouth, Devon PL3 4BB UK. Telephone +44-01752-560906.

Pitstop Motorcycles

Pitstop Motorcycles is a supplier currently recommended by UK CX/GL owners.

They can be reached at Pitstop Motorcycles Ltd., Pocket Nook Lane Industrial Estate, Lowton, Warrington, Cheshire, WA3 1AW UK. Telephone +44-01942-684684.

MOTEK

MOTEK is a German company that has been highly recommended for their stators.

They can be reached at MOTEK, Friedrich-Wilhelms-Bleiche 8a, D 33649 Bielefeld, Germany. Telephone +49-521-453744.

<u>Rick's Motorsport Electrics</u>

Rick's Motorsport Electrics is another source for quality rewinds.

Rick's rewound a couple of stators for other bikes I own. The work appears to be of high quality as can be seen in the photos below. These have also proven to be very reliable.







Monitoring the Charging System

The stock Honda CX/GL bikes do not have a way to monitor the electrical charging system. My solution to this problem is described <u>here</u>.

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